wherein a controlled pore size approaching 0.1 μm up to 0.5 μm is obtained using very high deformation rate flows in which the flow is predominantly extensional and low emulsification temperature, a pore size up to 300 μm is obtained using rate just above the critical deformation rate at which phase inversion takes place and high emulsification temperature, a large pore size up to 10,000 μm is obtained by controlled pore coalescence during polymerization, and a nano-pore size up to nm is obtained through solvent extraction after polymerization; and microcapillaries of diameter in the range 10 to 1000 μm are obtained by polymerizing about a 3D network of fibers and differing pore and interconnect sizes are obtained by co-extrusion of polyhipe emulsions.

63. (New) The process of claim 62, which further comprises in a first stage the formation of a high internal phase emulsion (HIPE) of an immiscible dispersed phase in a continuous phase, wherein the dispersed phase is void or contains dissolved or dispersed materials, and (co)monomers, oligomers and/or pre-polymers are present in the continuous phase, by introducing the dispersed phase by controlled dosing into the continuous phase with controlled mixing at controlled temperature and rate to achieve an emulsion of controlled pore size, and subsequently homogenizing for controlled period under controlled deformation and polymerizing under controlled temperature and pressure wherein controlled pore size of emulsions up to 0.5 μm are obtained using very high deformation rate flows in which the flow is substantially extensional and high emulsification temperature, the pore size up to 300 μm are obtained using rate just above the critical deformation rate at which phase inversion takes place, the large pore size up to 10,000 μm are obtained through the method of controlled pore coalescence during polymerization, and the nano-pore size up to nm are obtained through solvent extraction after polymerization and the microcapillaries are obtained by polymerizing about the 3D network of fibers.

64. (New) The process of claim 62, wherein the large pore size up to 10,000 μm is obtained by adding water soluble polymer to the aqueous phase or filler solutes to the oil phase at elevated concentrations with controlled pore coalescence during polymerization

65. (New) The process of claim 62, wherein the nano-pore size up to nm is obtained using

an oil phase filler selected from high boiling point hydrocarbon, another monomer or macromonomer, reactive or inert polymer and/or solid particles optionally with solvent extraction after polymerization.

66. (New) The process of claim 62, further comprising co-extruding polyhipe emulsions of differing pore and interconnect sizes.

67. (New) The process of claim 65, wherein polyhipe emulsions of differing pore and interconnect sizes are concentrically co-extruded.

68. (New) The process of claim 65, wherein polyhipe emulsions of differing pore and interconnect sizes are side-by-side co-extruded.

69. (New) The process of claim 62, further comprising using multiple-feed points with a prolonged dosing to create a large pore emulsion.

70. (New) The process of claim 62, wherein emulsification temperature is greater than 60 °C.

71. (New) The process of claim 62, wherein the homogenisation temperature is in the range of 60 to 150 °C.

72. (New) The process of claim 62, and further using an additional oil phase initiator.

73. (New) The process of claim 62, and further using an additional oil phase filler.

74. (New) The process of claim 62, wherein the emulsion comprises aqueous and non-aqueous phases.

75. (New) A microcellular polyhipe polymer scaffold suitable for growth of living matter for biomedical applications, made by the process of claim 61, which comprises a homogeneous

cross linked open cellular material defined by a bulk polymer matrix having a surface and an interface with an internal phase, and having porosity greater than 75% comprising emulsion derived pores of diameter in the range of 0.1 to 10,000 micron and emulsion derived pore interconnects of diameter in the range of up to 100 micron, wherein the scaffold comprises a plurality of discrete zones with location selected from:

at the polymer surface;

within its bulk matrix;

at the interface between polymer and internal phase; and

between adjacent but distinct pores or interconnects,

having a form and dimension of pore and interconnect type within each zone, and location of zones wherein adjacent zones are distinguished by boundaries, whereby zones are suitable for regulating positioning and morphology of living matter, wherein the scaffold comprises controlled pore sizes selected from the range up to 0.5 μm, up to 300 μm, up to 10,000 μm, and up to nm size and comprises pore interconnects selected from the range up to 100 micron, and approaching 500 micron, and wherein the scaffold comprises pore and interconnect sizes in different ranges in two or more distinct zones.

76. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the distinct zones are interpenetrating.

77. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein microcapillary networks are present within the emulsion derived pores.

78. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises more than one type of microcapillary.

79. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein each microcapillary type is distinguished by diameter, surface modification, interface porosity or pore size or chemical structure.

80. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein emulsion

derived pores comprise nanoporous walls which are void, increasing the size of interconnects or which contain filler polymers for extra strength.

81. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the scaffold is suitable for growth of living matter selected from cells, micro-organisms such as bacteria and virus and mixtures thereof.

82. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises microchannels formed of pores with interconnects suitable for providing communication and penetration of living matter for anisotropic (directional) growth thereof.

83. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the walls of the microchannels are biodegradable suitable for fusion of living matter in the biodegraded scaffold.

84. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises in individual zones, pore and interconnect sizes in different ranges, suitable for co-culturing two or more types of living matter.

85. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the ratio of interconnect to pore diameter is in the range $0 < d/D < 0.5$, when the pore diameter is less than about 200 microns.

86. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises extensive networks of elongate microcapillaries obtainable by moulding about fibrous inserts of diameter in the range from 10 micron up to 1000 micron, throughout the scaffold or zones thereof, separated by the microcellular polymer wherein microcapillaries are suitable for blood or nutrient supply channels, expression channels for living matter and seeding of living matter.

87. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the interface between a microcapillary wall and the bulk polymer provides a thin surface layer of the order of

0.5 to 5 microns, forming a zone particularly suited for directional (anisotropic) growth of living matter.

88. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the interface has smaller pore size than the bulk polymer wherein the zone is suitable for growth of cells forming a lining, for example cells lining the blood vessels or for growing endothelial cells on the interface surface.

89. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises a module of shell and tube type or cubic/polyhedric type with respect to direction and/or configuration of channels and/or microcapillaries.

90. (New) The microcellular polyhipe polymer scaffold of claim 75, which comprises a surface coating, using coating materials introduced in situ during polymerization or post polymerisation

91. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein polymer is selected from the group consisting of proteins, cellulose, polyacrylamide, polyvinyl in rigid or flexible form, poly(lactic acid), poly(glycolic acid), polycaprolactone, poly(lactide/glycolide), and polyacrylimide.

92. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the polymer comprises resiliently deformable or elastic material or is rendered resiliently deformable or elastic and is suitable for repeated stress and relaxation by means of oscillatory straining of the scaffold during cell growth facilitating rate of cell growth.

93. (New) The microcellular polyhipe polymer scaffold of claim 75, wherein the polyhipe scaffold is electrically conductive or is rendered electrically conductive whereby it is suitable for conducting an electric current during cell growth, facilitating distinguishing certain cell types and promoting growth and fusion of particular cell types.

94. (New) A biologically active system comprising a polyhipe scaffold made by the process of claim 26 and living matter providing normal cell functioning associated with a natural biologically active system present in the human or animal body, wherein living matter is selected from the group consisting of microorganisms or multiple cells selected from human, animal and plant cells.

95. (New) The biologically active system of claim 94, wherein the living matter is selected from the group consisting of isotropic tissue, bone cells, anisotropic cells, fibroblasts, chrondocytes, osteoblasts, bone marrow cells, hepatocytes, cardiomycytes neurons, myoblasts, macrophages and microvascular endothelium cells.

96. (New) The biologically active system of claim 95, wherein the isotropic tissue is obtained from cartilage, cornea, or marrow.

97. (New) The biologically active system of claim 95, wherein the ansiotropic cells are nerve, muscle, or blood vessel cells.

98. (New) A method for making the biologically active system of claim 94, which comprises providing cells on or in the polyhipe scaffold in a controlled environment and providing a suitable nutrient adapted for growth and providing conditions for growth promotion and positional control.

99. (New) The biologically active system of claim 94, wherein the system is an implant or a module that mimics a part of the human or animal body or for use in a growth environment.

100. (New) The biologically active system of claim 99, wherein the implant or the module is a contact lens, a dental filling, a cochlea implant, a vascular support, or a skin patch.

101. (New) The biologically active system of claim 99, wherein the implant or the module is an organ support module suitable for growth of specific organ cells in the polyhipe scaffold.